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TECHNICAL NOTE

MRL-TN-534

FIELD EVALUATION OF AUSTRALIAN RATION PACKS
ACCEPTABILITY OF THE INDIVIDUAL MEAL COMBAT RATION

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ABSTRACT

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The IMCR has been well received. Its success is due mainly to the inclusion of new, moderately spiced main meals. With minor changes to the drinks, confectionery and biscuits, it should be even more popular.

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ARMED FORCES FOOD SCIENCE ESTABLISHMENT

INDIVIDUAL MEAL COMBAT RATION USER QUESTIONNAIRE

In this survey we attempt to find out what you think about the Individual Meal Combat Ration. This questionnaire contains 4 styles of question described below:

1. The 'rating scale' contains a series of descriptive words. The question is answered by drawing a circle around the word that best fits your answer. For example:

'During a heat wave, do you drink fruit flavoured cordial:

ALWAYS OFTEN SOMETIMES RARELY NEVER?'

This would mean you usually drink fruit flavoured cordial but not always.

2. The simple YES/NO question where you circle the answer you agree with.

3. The checklist gives a series of possible answers. You place a tick in the box beside each answer you agree with. For example:

I drink cordial because:

IT QUENCHES MY THIRST

[✓]

IT IS REFRESHING

[✓]

IT IS INEXPENSIVE

[✓]

IT TASTES BETTER THAN BEER

[]

This would mean that you drink cordial because you find it thirst-quenching, refreshing and inexpensive - not because you prefer it to beer.

4. The final type of question asks you to give a simple written answer to the question. This is identified by a line.

Please don't hesitate to give your real opinion as the results of the survey will assist us in improving this ration for you the user.

CORPS _____

ARA/ARES (circle correct answer)

AGE _____

YEARS OF SERVICE _____

1. Did you discard any items?
(circle your answer)

YES/NO

If 'YES', please indicate which items and why.

Item: _____	Reason: _____
Item: _____	Reason: _____
Item: _____	Reason: _____
Item: _____	Reason: _____

2. What other foods (not in IMCR) did you take?

BISCUITS

3. Please give your opinion of the flavour and quantity of the biscuits by drawing a circle around the appropriate words.

SHORTBREAD

Flavour: VERY GOOD GOOD FAIR POOR VERY POOR

Quantity: TOO MUCH ENOUGH NOT ENOUGH

JAM SANDWICH

Flavour: VERY POOR POOR FAIR GOOD VERY GOOD

Quantity: NOT ENOUGH ENOUGH TOO MUCH

GINGERNUT

Flavour: VERY POOR POOR FAIR GOOD VERY GOOD

Quantity: TOO MUCH ENOUGH NOT ENOUGH

4. Should there be changes to the biscuits? If you agree, tick all the following changes you would like to see:

GREATER QUANTITY []

GREATER VARIETY []

MAKE USE OF SAVOURY BISCUITS,
e.g. CHEESE CRACKERS IN 1 MENU []

REDUCE QUANTITY []

OTHER (Please describe):

DRINKS

5. Are the drinks acceptable to you?
(circle your answer)

NO/YES

If 'NO', which ones are unsuitable and why?

Drink: _____ Reason: _____

Drink: _____ Reason: _____

Drink: _____ Reason: _____

6. Would you like to see any (or all) of the following changes (tick all you agree with)?

IMPROVE TASTE OF CORDIAL []

LEAVE CORDIAL AS IT IS, INCREASE TO
A QUANTITY SUITABLE TO MAKE 1 WATER BOTTLE []

IMPROVE TASTE AND INCREASE QUANTITY []

USE A CHOCOLATE DRINK SUCH AS MILO IN
SOME MENUS []

INCLUDE SOUP IN SOME MENUS []

OTHER (Please describe):

7. Is the sweetened condensed milk suitable?
(circle your answer)

NO/YES

If 'NO', what is a suitable alternative?

8. Is there sufficient condensed milk?
(circle your answer)

YES/NO

If 'NO', how much extra is required (circle appropriate percentage increase you would like):

20% 40% 60% 80% 100%

MAIN MEALS

9. The following questions ask you to give your opinion of the flavour of each main meal. There is also a heading 'Problems' for each meal. Examples of problems you may see are 'too fatty', 'too salty', 'insufficient quantity', 'not enough meat', 'not enough vegetable' or 'nothing to chew on'.

TORTELLINI

Flavour: VERY POOR POOR FAIR GOOD VERY GOOD

Problems: _____

SWEET AND SOUR MEATBALLS

Flavour: VERY POOR POOR FAIR GOOD VERY GOOD

Problems: _____

CHUNKY CHICKEN AND VEGETABLES

Flavour: VERY GOOD GOOD FAIR POOR VERY POOR

Problems: _____

MEATBALLS AND GRAVY

Flavour: VERY GOOD GOOD FAIR POOR VERY POOR

Problems: _____

LAMB AND VEGETABLES WITH ROSEMARY

Flavour: VERY POOR POOR FAIR GOOD VERY GOOD

Problems: _____

If 'NO', which of the following changes would you like to see (tick all you agree with)?

INCLUDE A SOLID MEAT PACK, e.g. CAMP PIE []

REDUCE THE NUMBER OF SPICY MEALS []

INCLUDE A BEEF MEAL,
e.g. BRAISED STEAK AND ONIONS []

INCREASE QUANTITY []

OTHER (Please describe):

SWEETS

11. Please give your opinion of both flavour and quantity of the sweets (Tropical 5 Lifesavers):

Flavour: VERY GOOD GOOD FAIR POOR VERY POOR

Quantity: NOT ENOUGH ENOUGH TOO MUCH

12. Should there be changes to the sweets?
(circle your answer)

NO/YES

If 'YES', tick all the following changes you agree with:

INCREASE VARIETY []

INCREASE QUANTITY []

USE SOME DRIED FRUIT []

DECREASE QUANTITY []

OTHER (Please describe):

13. Please give your opinion of the quantity of sugar by drawing a circle around the appropriate word below:

NOT ENOUGH

ENOUGH

TOO MUCH

GENERAL

14. Is there enough food in each pack?
(circle your answer)

YES/NO

15. If you could add one item to the pack, what would be your choice?

16. If you could have one item deleted, what would be your choice?

17. Were the non-food items satisfactory (matches, can opener, rubber band, toilet paper, pad scouring with soap)?
(circle your answer)

NO/YES

If 'NO', which items are unsatisfactory, why?

Item: _____ Reason: _____

Item: _____ Reason: _____

Item: _____ Reason: _____

18. List any further suggestions you have for improving the Individual Meal Combat Ration.

Thank you for taking the time to fill in this form. Your cooperation will help us to improve the acceptability of the Individual Meal Combat Ration.

INDIVIDUAL MEAL (COMBAT RATION)

CONTENTS SHEET

MENU A	MENU B	MENU C
Tortellini 1 x 225 g pkt	Sweet and Sour Meatballs 1 x 225 g pkt	Chunky Chicken and Vegetables 1 x 225 g pkt
Biscuits, Shortbread 1 x 85 g pkt	Biscuits, Jam Sandwich 1 x 85 g pkt	Biscuits, Shortbread 1 x 85 g pkt
Fruit Juice Powder, Orange 1 x 14 g pkt	Fruit Juice Powder - Lemon 1 x 14 g pkt	Fruit Juice Powder - Lime 1 x 14 g pkt

MENU D	MENU E
Meatballs and Gravy 1 x 225 g pkt	Lamb and Vegetable with Rosemary 1 x 225 g pkt
Biscuits, Jam Sandwich 1 x 85 g pkt	Biscuits, Gingernut 1 x 85 g pkt
Fruit Juice Powder - Orange 1 x 14 g pkt	Fruit Juice Powder - Lime 1 x 14 g pkt

The following items are common to all menus:

Sweetened Condensed Milk 1 x 20 g	Matches 1 x box
Sugar 4 x 7 g	Can Opener 1 x Mos
Tea Bags 2 x Mos	Rubber Band 1 x Mos
Instant Coffee 1 x 3.5 g	Toilet Paper 1 x 10 sheets
Sweets (Lifesavers, Tropics) 5	Pad Scouring with Soap 1 x Mos

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FIELD EVALUATION OF AUSTRALIAN RATION PACKS
ACCEPTABILITY OF THE INDIVIDUAL MEAL COMBAT RATION

1. INTRODUCTION

Previous reports have described the field studies and recommendations for improvement of the Combat Ration One Man (CRIM) (Forbes-Ewan & Waters, 1986), and the Combat Ration Ten Man (CRIOM) (Forbes-Ewan & Waters, 1987). The Patrol Ration One Man (PRIM) will be studied in the field in late 1987 or early 1988.

This report concerns the field acceptability of the new Individual Meal Combat Ration (IMCR). This is a self-contained meal providing food and beverages for a period which includes a normal meal time. It may be issued as a breakfast, lunch or dinner. The IMCR first appeared in the field in 1986.

In concept, the ration pack resembles the "Meal Ready To Eat" used by the U.S. Army. There are five menus of the IMCR, with items such as tea, coffee, milk and sugar common to each menu. As the name implies, the ration pack is designed to provide a meal; it is not intended that three packs would be issued to constitute a day's ration. An example of an appropriate situation is a patrol which leaves base after breakfast and returns before the evening meal.

The main meal items represent an attempt to satisfy a perceived demand for meals which are more appetising than those in the previously existing packs. Therefore, meals such as Tortellini and Sweet and Sour Meatballs have been included. The aim of this study was to determine the initial field acceptability of the IMCR, particularly of these new main meals, to a wide range of normal users. The results will be used as "baseline" acceptability data. The results of future studies will be compared with these baseline data to allow identification of items whose acceptabilities have diminished and which need to be replaced.

The IMCR, along with the "one man" ration packs is required to:

- (i) be able to be prepared with only a heating device and water;
- (ii) have main meals which can be eaten without preparation;
- (iii) be as light and compact as possible, yet have sufficiently robust packaging to prevent damage by insects, rodents, the elements or transportation;
- (iv) have a shelf life of at least 12 months in temperate areas and 9 months in tropical areas;
- (v) satisfy nutritional requirements and be acceptable to Australian servicemen (DOD, 1985).

In addition, components should be made in Australia.

2. METHODS

The study consisted of four field trips and involved interviews with users of the IMCR as well as completion of a questionnaire, a copy of which is enclosed. The design of the questionnaire followed the advice given by 1 Psych Unit (Army). It attempts to gain as much information as possible — did the soldier like the item; was there enough; could it be improved; if not, what is a suitable replacement? Forbes-Ewan & Waters (1988) discuss the development of the questionnaire in detail.

Two exercises were identified by Land Command as suitable for our study. The criteria for suitability were:

- (i) a minimum of 250 soldiers;
- (ii) availability of all 5 menus of IMCR;
- (iii) IMCR to be used in approximately equal proportions for breakfast, lunch and dinner;
- (iv) an observer should be able to discuss the ration with users and distribute and collect questionnaires.

These criteria were a guide to Land Command as to the type of exercise which would be ideal for this study. In practice, not all of these criteria are likely to be met. For example, supply problems can lead to systems of feeding which differ from the ration plan.

The exercise chosen was Exercise Diamond Dollar, Shoalwater Bay Training Area, Queensland, August 1986. Soldiers of 8/9 Battalion Royal Australian Regiment (8/9 RAR) were surveyed. At this exercise, several of our criteria were not met. Fewer than 250 soldiers returned questionnaires and supply problems beyond our control meant that some soldiers received only one or two menus. Therefore, a second exercise was attended to increase the number of soldiers surveyed to at least 250. This was a company level exercise involving 3 Battalion Royal Australian Regiment (3 RAR) at Conjola State Forest, New South Wales, March 1987.

In addition, the opportunity was taken to obtain information on the acceptability of the IMCR to members of the Army Reserve (ARes) when an observer attended the annual camp of Adelaide University Regiment (AUR), in January 1987. Finally, an observer attended a small adventure training exercise (Big Apple), with a unit of Logistic Command (LOG COMD), in southern Tasmania, November 1986. IMCR was included in the ration plan for this exercise.

By attending these additional exercises, all criteria were able to be satisfied.

Questionnaires were distributed before deployment of 8/9 RAR and 3 RAR. However, this approach was only partially successful. Of 300 questionnaires distributed among 8/9 RAR, only 141 (47%) were completed and returned. The return rate from A Company 3 RAR was even lower. Inclement weather led to the destruction of most of the first issue of questionnaires while they were being carried in the subjects' uniforms. Therefore, new questionnaires were issued to the company on their return to barracks. The return rate was close to 100%.

Those members of AUR who had eaten the IMCR received questionnaires at the conclusion of their field exercise. These were completed in a lecture room and a return of about 90% was effected. All LOG COMD subjects received questionnaires at the beginning of their exercise. Each member completed his questionnaire when convenient. All issued questionnaires were completed and returned.

All groups had access to an observer to make comments and ask questions during the field phases of this study. Observers attempted to gain the confidence of subjects by living and working with them for

several days. Interviews (informal and unstructured) were conducted in a relaxed atmosphere during halts in training. Each interview was conducted with a small group of soldiers (2-10 per group). Soldiers were usually at a low state of alert and could direct their attention to the acceptability of the IMCR. Each interview began with an explanation of the nature and purpose of the study. Questions about the strengths and weaknesses of the IMCR invariably stimulated discussion and opinions were freely given. Frequently, soldiers would approach the observer with suggestions to improve the IMCR. These would then be discussed with the next group interviewed.

Altogether, 329 completed questionnaires were returned; 141 from 8/9 from RAR, 94 from 3 RAR, 76 from AUR and 18 from LOG COMD.

Analysis of Variance (ANOVA) was used to determine whether or not significant differences of opinion exist between the groups. Responses to questions 7, 8, 12 and 14 were analysed. These questions were chosen because they could be answered by all respondents, ie. they do not refer to specific menus. The results were then combined and analysed as representing the Australian Army.

3. RESULTS

3.1 Characteristics of the Sample Groups

Table 1 shows the number of respondents, average age and number of years of service for each group.

TABLE 1: Characteristics of the Sample Groups

GROUP	NUMBER OF RESPONDENTS	AVERAGE AGE	AGE RANGE	AVERAGE YEARS OF SERVICE	RANGE OF YEARS OF SERVICE
8/9 RAR	141	23.1	17-39	4.7	1-23
3RAR	94	21.0	17-37	3.2	1-15
AUR	76	23.6	17-47	5.1	1-27
LOG COMD	18	30.1	19-42	10.6	1-19

No significant differences ($p=0.67$) were found between the groups with respect to questions 7,8,12 and 14. Therefore, the results below are for the combined sample and are regarded as representing the Australian Army.

3.2 Discards (Question 1 in the enclosed questionnaire)

Table 2 shows the most commonly discarded items, the percentages discarding those items and the most common reason for discarding each item.

Altogether, 122 soldiers (36.0%) discarded at least one food item. Seventy-three (22.2%) discarded 1 food item, 28 (8.5%) discarded 2 and 21 (6.4%) discarded 3 or more. Where multiple items were discarded, they were usually drink items, eg. coffee and sugar, fruit drink powder and coffee, tea and sugar, or tea, coffee and sugar.

TABLE 2: Most Commonly Discarded Items

ITEM	PERCENTAGE DISCARDING	MOST COMMON REASON
Scouring Pad	17.6	Not used
Tea Bags	11.9	Don't drink tea
Coffee	11.1	Don't drink coffee
Sugar	7.3	Not used
Fruit Drink Powder	7.0	Dislike/Unacceptable
Shortbread Biscuits	6.1	Dislike/Unacceptable
Menu Sheet	5.8	Not used
Toilet Paper	5.2	Unsatisfactory/Brought own

3.3 Commercially Bought Items (Q. 2)

Table 3 shows the commercially bought items most commonly taken into the field and the percentages taking them.

TABLE 3: Most Common Commercially Bought Items

ITEM	PERCENTAGE TAKING THE ITEM
Noodles	11.6
Fruit	7.6
Sauces/Spices	4.6
Muesli Bars	4.3
Milo	3.0
Canned Fish/Seafood	3.0
Chocolate	2.7

Altogether, 110 soldiers (33.3%) reported taking commercially bought items. Fifty-five (16.7%) took 1 item; 31 (9.4%) took 2 items and 24 (7.3%) took 3 or more. There was no discernible pattern among the multiple items: soldiers were as likely to take noodles, Milo and dried fruit as they were to take Milo, canned fish and sauces.

3.4 Biscuits (Qs. 3 and 4)

Figure 1 shows the frequency distributions for opinions on the flavour and quantity of biscuits. There is a high frequency of "No Answer" for two reasons: firstly, not all soldiers received all menus of the IMCR; secondly, it became evident that Biscuits, Gingernut were not present in Menu E. Later investigation showed that Biscuits Gingernut were unable to be procured. Menu E contained Biscuits Shortbread instead.

In Figure 1, the bars for "No Answer" have not been drawn so that attention is not directed away from the bars derived from valid responses. To the right of each heading, the number of respondents to that question is indicated.

Nearly one third (30%) of respondents would prefer a greater quantity and 53% a greater variety of biscuits; 50% would like savoury biscuits and 4% favoured reducing the quantity.

3.5 Drinks/Condensed Milk (Qs. 5-8)

In answer to the question "Are the drinks acceptable to you", 70% circled "YES" and 21% "NO".

The fruit flavoured drink powder ("cordial") was unacceptable to 16% of respondents, the most common complaint being its poor taste (10% of respondents). Five per cent identified the coffee as unacceptable.

The suggestion that the flavour of the cordial should be improved was favoured by 45% of respondents, while 25% would leave the cordial as it is and increase the quantity; 70% favoured improving the flavour and increasing the quantity.

A chocolate drink would be appreciated by 72% and 57% agreed that soup should be included in some menus.

Sweetened condensed milk was acceptable to 91% of our respondents; 36% would like more.

3.6 Main Meals (Qs. 9 and 10)

Figure 2 shows the frequency distributions for flavour of the canned meals. To the right of each heading, the number of respondents to that question is indicated. Beside the bar graph for each meal is a list of "problems" encountered and the percentage of respondents reporting each problem.

As for the biscuits above, many soldiers did not receive every meal. This explains the high frequency of "No answer". The reported percentage for each problem is the percentage of those answering the question, not of the whole sample.

The bars for the invalid responses ("No Answer") have not been drawn so that attention is not directed away from the bars for the valid responses.

Main meals were satisfactory to 75% of our sample; 16% were dissatisfied, 11% would like a solid meat pack such as "Camp Pie". A reduction in the number of spicy meals was favoured by 5% and 18% agreed with the suggestion to include a beef meal, e.g. Braised Steak & Onions.

3.7 Confectionery/Sugar (Qs. 11-13)

Figure 3 shows the frequency distributions for flavour and quantity of the Tropical 5 Lifesavers. The number of respondents to each question is indicated after each heading.

Responding to the question "should there be changes to the sweets" 57% circled "YES", 19% "NO". More variety was requested by 54% and 50% favoured the addition of dried fruit. A third (33%) would like an increase in quantity and 2% agreed with the suggestion to decrease quantity.

The quantity of sugar was considered "enough" by 60%, 18% thought there was "too much" and 17% that there was "not enough".

3.8 General (Qs. 14-18)

Most respondents (71%) believe that there is enough food in each pack; 24% that there is not enough.

The most commonly suggested additional items and the percentages suggesting these items were Chocolate (16%), Fruit (16%), Cheese (12%), and Noodles (5%).

The items most commonly suggested for deletion and the corresponding percentages were Scouring Pad (12%), Shorbread Biscuits (7%), *Lifesavers* (6%) and cordials (5%).

Responding to the question "Were the non-food items satisfactory", 71% replied "YES", 19% "NO".

The non-food items most commonly identified as unsatisfactory, with the corresponding percentages were Scouring Pad (12%), Toilet Paper (9%) and Matches (9%). The most common reasons for dissatisfaction were Scouring Pad — "No Use" (46% of those dissatisfied), Toilet Paper — "Not Enough" (61%) and Matches — "Box Unsuitable" (61%).

Further suggestions to improve the pack included "Add Fruit" (6%), "More Variety" (5%), "Add Chocolate" (5%) and "Add Cheese" (4%).

4. DISCUSSION

Due to supply problems beyond our control, some soldiers did not receive all menus of the IMCR. Therefore, items unique to one or two menus (biscuits and main meals) were not eaten by all soldiers sampled. Even so, we received enough responses to most questions to allow firm recommendations to be made. Where insufficient answers were obtained, this is acknowledged in the discussion; recommendations are made only when enough data were obtained to justify them.

Although it was eaten at all meals, the IMCR was most commonly used to provide the evening meal, probably because soldiers had more time for food preparation in the evening.

4.1 Discards (Q. 1)

Table 2 shows that no food item was singled out as being especially unacceptable. The relatively high discard rates for tea and coffee are expected as many people drink either tea or coffee but not both.

The scouring pad was the most commonly discarded item. Many soldiers commented that they usually do not have enough water to make full use of the pad. However, our observations and discussions with soldiers indicate that soldiers rarely use mess tins; foods are usually eaten directly from the can. Nevertheless, deletion of the scouring pad is not recommended, because the IMCR should be self-contained, i.e. provide all food and non-food items that may be required.

As well as discarding some items, many soldiers exchange foods. The most common exchange involves tea and coffee. Exchanging unrelated food items will have some effect on the nutritional balance of the pack. However, the effect is less for a one meal pack than it would be for a one day pack. The number and types of exchange observed during this study are likely to have minimal effect on nutrition in the field.

4.2 *Commercially Bought Items (Q. 2)*

From Table 3 it is clear that the most commonly bought food was noodles. This is consistent with the results reported by Forbes-Ewan & Waters (1986) that the most popular extra food, taken by users of the Combat Ration one Man (CRIM), was noodles. As noodles have been added to the CRIM, there is probably no need to include them in the IMCR. However, new menus of all ration packs are required, to extend the range available and hence increase variety. Our results suggest that meals with meat and a form of pasta such as noodles would be well accepted in the field.

Fruit, sauces/spices and muesli bars were also among the most common extra foods to accompany the IMCR and the CRIM. Muesli bars are discussed in the next section.

The need for sauces and spices in the IMCR is not great as the main meals in this pack are already moderately spiced. However, dried fruit might replace confectionery in one menu, provided that storage characteristics are satisfactory. A range of dried fruits is currently being evaluated at this Establishment. The finding that 50% of the sample would like dried fruit added to the pack (section 3.7) supports this suggestion.

Recommendation 1: That dried fruit became the confectionery item in one menu, subject to the identification of dried fruit(s) with satisfactory shelf lives.

4.3 *Biscuits (Qs. 3 & 4)*

Figure 1 shows that Biscuits, Jam Sandwich were very popular, perhaps because they have not recently been in ration packs normally available to these groups. Biscuits, Shortbread were less well received although still acceptable to a majority. This may be because they have been in all menus of the CRIM for several years. The popularity of muesli bars, found by Forbes-Ewan & Waters (1986) and in this study, suggests that replacement of biscuits, Shortbread by muesli bars in one menu would be well received. Although Biscuits Ginger Nut were not actually in Menu E, 23% of respondents assigned an acceptability rating to this item. Some soldiers may have taken commercially bought biscuits Ginger Nut into the field; others were undoubtedly familiar with them from the mess or civilian life. The "valid" responses, totalling 23, can be assumed to represent the acceptability ratings these biscuits would have received had they been present. However, the number of responses was too small to allow any estimate of their field acceptability.

Recommendation 2: Replace Biscuits, Shortbread with muesli bars in one menu.

Insufficient information was obtained on the acceptability of the Biscuits, Gingernut to draw any conclusion.

About one half of our sample would like a greater variety of biscuits and a similar proportion would like savoury biscuits to replace sweet biscuits in one menu. Acceptability and storage trials of several varieties of savoury biscuits are being conducted at this Establishment. However savoury biscuits, e.g. cheese crackers, present a problem in that they are easily crushed. If savoury biscuits are to be added, they should be firm or packaged so as to resist breakage.

In the absence of definitive data on the acceptability of Biscuits, Gingernut, the most appropriate exchange appears to be savoury biscuits for biscuits, Shortbread.

Recommendation 3: Subject to identification of a suitable biscuit, savoury biscuits should replace Biscuits, Shortbread in one menu.

4.4 Drinks/Condensed Milk (Qs. 5-8)

The least acceptable drink was the fruit flavoured cordial. Forbes-Ewan and Waters (1986) reported a similar result with the cordial in the CRIM. This is not surprising as the formulations are identical. New formulations have been developed and are now in service in the CRIM. These contain aspartame rather than saccharin. Taste panel assessment suggests that the new powders are more acceptable than the saccharin-based cordials. The new powders will be used in the IMCR in future.

Although tea and coffee are of adequate acceptability, there is a strong demand for a chocolate drink. Several commercially available chocolate drinks are undergoing acceptability and storage trials. To make the drink suitable for field use, it may be necessary to add milk powder to the base formulation. Alternatively, a mix of cocoa, sugar, flavouring and wetting agent could be provided. This would be less susceptible to wetting and should therefore have better shelf life than the mix containing milk powder. The source of milk for this mix could be the sweetened condensed milk already in the IMCR. The quantity of sweetened condensed milk provided could easily be increased if necessary. The sweetened condensed milk was extremely popular, a similar result to that reported by Forbes-Ewan & Waters (1986) for sweetened condensed milk in the CRIM.

More Australian soldiers drink coffee than tea (Forbes-Ewan & Waters, 1986) and there is only one sachet of coffee provided compared to two tea bags. Therefore any chocolate drink should replace tea rather than coffee.

Recommendation 4: Subject to identification of a suitable product, it is recommended that a chocolate drink replace one tea bag in each of two menus.

4.5 Main Meals (Qs. 9 & 10)

Only about half the sample responded to the questions on flavour of the main meals. As discussed above, this was due to a supply problem which meant that not all menus were distributed to all units.

Nevertheless, Figure 2 shows that most of those who did try the main meals found them to be "good" or "very good". The majority of soldiers were satisfied with the main meals as they are. This may be because all these meals have not appeared in the field before; the next field assessment of the IMCR, tentatively planned for 1990, will reveal the extent to which novelty contributed to their acceptability.

Although generally very satisfactory, two of the main meals were commonly criticised as having insufficient meat; these are Chunky Chicken & Vegetables and Lamb & Vegetables with Rosemary. Nutritional analysis of these meals suggests that the meat level is, in fact quite high (James et al, 1988). It is believed that the perception of insufficient meat is due to the manufacturer's practice of blending some vegetables to allow the products to be canned. Reformulation of these meals to include larger pieces of meat and/or vegetables should overcome this problem.

Recommendation 5: That the main meals Chunky Chicken & Vegetables and Lamb & Vegetables with Rosemary be reformulated to eliminate the impression of insufficient meat/excessive gravy.

4.6 Confectionery/Sugar (Qs. 11-13)

Figure 3 indicates that the *Lifesavers* are acceptable. However, a majority of our sample favoured increasing the variety of confectionery available. Since this trial was done, the variety of confectionery has been increased by using a different flavour of *Lifesavers* in each menu. In paras 4.2 above and 4.7 below, recommendations are made which will add even more variety to the confectionery.

The majority of our sample were satisfied with the amount of sugar available.

4.7 General (Qs. 14-18)

Most soldiers agreed that there was enough food in the pack.

The most commonly suggested additional items were chocolate, fruit and cheese. The addition of dried fruit has already been recommended. Cheese is probably not an appropriate item without survival biscuits.

Because of its popularity in the CRIM (Forbes-Ewan & Waters, 1986) and our findings here, chocolate would almost certainly be a welcome addition to the IMCR. Chocolate could be used as a confectionery item in at least one menu.

Recommendation 6: That chocolate be used as the confectionery item in one menu.

The item most commonly suggested for deletion was the scouring pad. Its deletion is not recommended for reasons already discussed.

Shortbread biscuits, *Lifesavers*, cordials, coffee and tea were the other items most often suggested for deletion. These have all been dealt with in the discussion above.

Apart from the scouring pad, the least satisfactory non-food items were toilet paper and matches. The main complaint about toilet paper was the small quantity provided. It is difficult to accept that insufficient toilet paper is provided; with 10 sheets, the IMCR contains as much paper for one meal as the CRIM provides for one day.

The main problem with the matches was the weakness of the match box. The box has been strengthened and this problem is believed to have been overcome.

5. CONCLUSIONS

The IMCR is a compact one meal ration pack which has been well received in the field. Its main attribute is the new and different main meal items. These need only slight modifications to make them even more acceptable. With a greater variety of drinks and confectionery, the replacement of some sweet biscuits with savoury biscuits, and dried fruit, the acceptability of the IMCR will be even further enhanced.

6. SUMMARY OF RECOMMENDATIONS

1. That dried fruit replace *Lifesavers* in one menu. This recommendation is subject to the identification of dried fruit(s) with suitable storage characteristics.

2. Replace Biscuits, Shorbread with muesli bars in one menu.
3. Subject to identification of a suitable biscuit, savoury biscuits should replace Biscuits, Shortbread in one menu.
4. Subject to identification of a suitable product, it is recommended that a chocolate drink replace one tea bag in each of two menus.
5. That the main meals Chunky Chicken & Vegetables and Lamb & Vegetables with Rosemary be reformulated to eliminate the impression of insufficient meat/excessive gravy.
6. That chocolate be used as a confectionery item in one menu.

7. REFERENCES

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8. FIGURES

SHORTBREAD (n=296)

Flavour	Percent	
Very Good	14	=====
Good	35	=====
Fair	28	=====
Poor	8	=====
Very Poor	5	=====
No Answer	10	
Quantity	Percent	
Not Enough	8	=====
Enough	66	=====
Too Much	9	=====
No Answer	17	

JAM SANDWICH (n=273)

Flavour	Percent	
Very Good	34	=====
Good	22	=====
Fair	5	=====
Poor	2	=====
Very Poor	2	=====
No Answer	35	
Quantity	Percent	
Not Enough	21	=====
Enough	31	=====
Too Much	1	=====
No Answer	40	

GINGERNUT (n=76)

Flavour	Percent	
Very Good	3	=====
Good	10	=====
Fair	7	=====
Poor	0	
Very Poor	3	=====
No Answer	77	
Quantity	Percent	
Not Enough	5	=====
Enough	14	=====
Too Much	1	=====
No Answer	80	

FIGURE 1. Opinions of the Flavour and Quantity of Biscuits.

TORTELLINI (n=158)

Flavour	Percent		
Very Good	17	=====	Problems Insufficient Quantity, 4.5%
Good	19	=====	
Fair	4	=====	
Poor	0	=====	
Very Poor	1	=====	
No Answer	52		

SWEET AND SOUR MEATBALLS (n=174)

Flavour	Percent		
Very Good	17	=====	Problems Inedible cold, 3% Too runny, 3%
Good	24	=====	
Fair	7	=====	
Poor	2	=====	
Very Poor	2	=====	
No Answer	47		

CHUNKY CHICKEN AND VEGETABLES (n=155)

Flavour	Percent		
Very Good	13	=====	Problems Insufficient meat, 7%
Good	22	=====	
Fair	8	=====	
Poor	2	=====	
Very Poor	2	=====	
No Answer	53		

MEATBALLS & GRAVY (n=141)

Flavour	Percent		
Very Good	14	=====	Problems Insufficient meat, 4%
Good	19	=====	
Fair	6	=====	
Poor	3	=====	
Very Poor	1	=====	
No Answer	57		

LAMB & VEGETABLES WITH ROSEMARY (n=191)

Flavour	Percent		
Very Good	23	=====	Problems Insufficient meat, 7%
Good	24	=====	
Fair	8	=====	
Poor	1	=====	
Very Poor	1	=====	
No Answer	42		

FIGURE 2. Opinions of the Acceptability of the Main Meals and Perceived Problems

Flavour (n=316)

	Percent	
Very Good	30	=====
Good	41	=====
Fair	18	=====
Poor	5	=====
Very Poor	2	=====
No Answer	4	=====

Quantity (n=290)

	Percent	
Not Enough	34	=====
Enough	52	=====
Too Much	2	=====
No Answer	12	=====

FIGURE 3. Opinions of the Flavour and Quantity of the Confectionery

ANNEX A: MOST COMMON COMMENTS OBTAINED IN THE FIELD

Comments made by soldiers in the field can be broadly divided into two categories; (a) those directly related to the food in the ration packs and (b) other suggestions. Many of these comments relate to ration packs in general, not just to the IMCR.

(a) Suggestions Relating to Food Items

- (i) Fruit should be added, e.g. sultanas.
- (ii) Use a higher quality coffee, e.g. Nescafe.
- (iii) Add muesli bars.
- (iv) Delete Biscuits, Shortbread as they crumble and have been in ration packs for many years.
- (v) Increase the number and decrease the size of meat balls in Meat Balls & Gravy and Sweet & Sour Meat Balls.
- (vi) Increase the variety of confectionery.
- (vii) Chunky Chicken & Vegetables and Lamb & Vegetables with Rosemary are too watery.
- (viii) Lifesavers become sticky in hot/tropical conditions.
- (ix) Add canned seafood.
- (x) Use some less spicy meals, e.g. baked beans, sausages.

(b) Other Suggestions/Comments

- (i) Ration packs are too heavy.
- (ii) Use resealable plastic containers.
- (iii) Use mat green cans similar to the colour of the jam and milk tubes.
- (iv) Meals should all be acceptable cold; the Sweet & Sour Meatballs are unacceptable unless heated.
- (v) Introduce one vegetarian menu.
- (vi) Improve the quality of the toilet paper.
- (vii) Improve the strength of the match box. Ensure that the matches are water proof (many soldiers claim that the water proofing is often non existent).
- (viii) Include water sterilisation tablets in the packs.
- (ix) Pack all "brew" gear (tea, coffee, milk, sugar) in small, resealable plastic bags, separately from the IMCR, but in the same intermediate container. These could then be placed in an equipment pouch and be readily accessible during short breaks.
- (x) Include hexamine tablets, service flannelette, oil and camouflage cream.

ANNEX B: SUGGESTED REVISED MENU LISTING FOR THE IMCR

Menu A		Menu B		Menu C	
Tortellini	1 x 225g	Sweet & Sour Meatballs	1 x 225g	Chunky Chicken & Vegetables	1 x 225g
Muesli Bars	2 x 30g	Biscuits, Jam Sandwich	1 x 85g	Biscuits, Savoury	1 x 85g
Fruit Juice Pdr, Orange	1 x 10g	Fruit Juice Pdr, Lemon	1 x 10g	Fruit Juice Pdr, Lime	1 x 10g
Chocolate	1 x 50g	Lifesavers Tropical 5	1 x 20g	Lifesavers, Musk	1 x 20g
Tea Bags	2 Nos	Chocolate Drink	1 x 30g	Tea Bags	2 x Nos
		Tea Bag	1 No		

Menu D		Menu E	
Meatballs & Gravy	1 x 225g	Lamb & Veg With Rosemary	1 x 225g
Biscuits, Jam Sandwich	1 x 85g	Biscuits, Gingernut	1 x 85g
Fruit Juice, Pineapple	1 x 10g	Fruit Juice, Apple	1 x 10g
Sultanas	1 x 40g	Lifesavers, Spearmint	1 x 20g
Tea Bags	2 Nos	Chocolate Drink	1 x 30g
		Tea Bag	1 No

The following items are common to all menus:

Sweetened condensed milk	1 x 28g	Matches	1 box
Sugar	4 x 7g	Can Opener	1 No
Instant Coffee	1 x 3.5g	Rubber Band	1 No
Toilet Paper	10 sheets	Pad Scouring	1 No

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ABSTRACT

Four field studies of the acceptability of the recently introduced Individual Meal Combat Ration (IMCR) were conducted. These involved elements of the Australian Regular Army and the Army Reserve with varying workloads in a range of climatic conditions.

The IMCR has been well received. Its success is due mainly to the inclusion of new, moderately spiced main meals. With minor changes to the drinks, confectionery and biscuits, it should be even more popular.

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